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Published in:
Economic Systems

DOI:
10.1016/j.ecosys.2006.08.002

Publication date:
2007

ELSEVIER

Economic Systems 31 (2007) 49–70

ECONOMIC SYSTEMS

www.elsevier.com/locate/ecosys

Why do Japanese firms prefer multiple bank relationship? Some evidence from firm-level data

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Received 24 January 2006; received in revised form 26 May 2006; accepted 4 August 2006

Abstract

We explore the determinants of the number of long-term bank relations of listed Japanese firms using a unique data set covering the sample period of 1982–1999. Japanese listed firms have about seven long-term bank loan relations on average, but show a large variation around the mean. We use data on loan and equity ownership to address the impact of the Japan-specific bank–firm relations and bank control on the number of loans decision. We find that having a relation with a top-equity holding bank increases the number of bank relations and debt-rich and cash-poor firms have more bank relations.

JEL classification : G21; G32

Keywords: Firm–bank relations; Single versus multiple borrowing; Bank control; Discrete choice model

1. Introduction

We analyze the choice of the number of long-term banking relations of Japanese listed firms in the period 1982–1999. Firm–bank relations are at the core of Japanese economic development in the post-war period and it is widely believed that long-term loans have been essential to enhance the rapid Japanese economic growth in the 1960s and 1970s. As is well-known, in post-war Japan long-term bank loans were the number one source of external funds for almost all firms (see Fukuda, 2001). Except for a few cash-rich firms, internal financing was, in general, limited. As Ito (1992) shows, internal financing in the 1960s and 1970s has been only about 20% of the total

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0939-3625/$ – see front matter © 2007 Published by Elsevier B.V.
doi:10.1016/j.ecosys.2006.08.002

corporate financial needs (as compared to 50% for the U.S.). The dominant role of long-term loans in external finance is reflected in the fact that until the mid-1980s bond financing has been strictly regulated (even after 1985 only very large firms were able to issue bonds). Large banks were also key players in the Japanese industrial group structure called *keiretsu*, wherein lending activity, combined with equity ownership, was relatively important (see, e.g. Flath, 1993). And still in the keiretsu structure, firms have a strong and long-lasting relation with the so-called main bank in the group. The main bank plays a dominant role in providing loans to the affiliated firms, but firms nonetheless borrow from banks outside the group. We investigate why firms have ties with other banks besides their main bank and what determines the optimal number of creditors in the presence of main banks.

It is often argued that the bank–firm relationship changed in the course of the bubble (up to 1989)—and post-bubble (after 1990) period. There are several factors that explain this change. First, financial deregulation allowed firms to issue public debt, which made firms less reliant on bank loans. Secondly, banks are burdened with heavy non-performing loans after the collapse of the bubble, which hindered the intermediary role of banks. A rather unique feature of our data enables us to answer this question empirically. Our data set contains the time-series information for long-term loans for the years 1982–1999. How does the bad loan problem affect individual firm decisions to contract banks? We illustrate this in Fig. 1, which gives the percentage of single-bank relations of 14,055 firm-year observations for the years 1982–1999. The percentage of single-bank to all relations is at most 13% and, on average, Japanese firms do have multiple banking contacts. Fig. 1 also suggests that during the bubble period firms tended to rely on a single relation, while in the period of long stagnation after the collapse of the bubble the average percentage of multiple contracts increases.

Our study, based on this unique data set, has advantages over the previous studies. Contrary to earlier cross-section studies on the optimal number of bank relationships (see, e.g. Detragiache et al., 2000; Degryse and Ongena, 2001; Houston and James, 2001) we exploit, like Farinha and Santos (2004) and Foglia et al. (1998), both the time and cross-sectional variation. Farinha and Santos, though, focus on the timing of switching from one to multiple bank relations for especially young firms and Foglia et al. study the effects of the borrowing structure on the

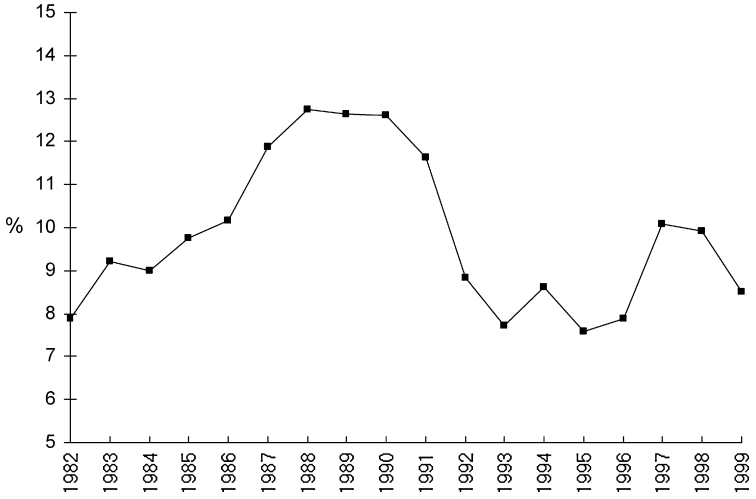

Fig. 1. Percentage of firms with a single long-term bank loan.

thoroughness of the banking system's overall monitoring of individual borrower firms. The scope of our paper is broader, as we have a general interest in multiple relations of large listed Japanese firms, for which control of ownership matters. We include information with respect to the Japanese corporate (bank) control mechanism using variables that define top loan and equity ownership on the firm level. This feature is especially relevant to the *keiretsu* structures.

We proceed as follows. First, we give a review of the literature on the determination of the optimal number of bank relations and main bank contacts. The theoretical background of our paper is a key problem in financial economics: what is the optimal number of creditors? These creditors can be holders of either public or private claims. We analyze the private component, namely the number of bank contracts per firm (which finds support in the fact that the Japanese bond market has been less important in the provision of debt). In the literature on corporate finance, the main interest lies on the game between the provider of capital and the firm regarding the control rights that belong to the assets. This game can cover the choice between equity and debt, the rights of equity holders (Shleifer and Vishny, 1997), or the composition of external financing (Bolton and Scharfstein, 1996). We pay special attention to the literature that relates the theory of the optimal number of bank contacts and the role of main banks. Next we describe the data which are provided by the Japan Economic Research Institute and the Development Bank of Japan and form a rather rich set of detailed balance sheet and profit–loss account data as well as indicators of ownership of both (long-term) loans and equity. We give an extensive descriptive overview of the variables of interest in Section 3. In Section 4 we present an econometric analysis of the decision to borrow from different banks. Since our main dependent variable, the number of bank relations, is a discrete variable, we estimate several discrete choice models. We find that size, profitability, solvability, liquidity, and alternative financing forms determine the number of banking contacts. We also find support for the liquidity insurance argument to have multiple relations. Finally we show that firms having a so-called main bank relation tend to have a preference for multiple loan contacts. In the last section we summarize and conclude.

2. Theory on the optimal number of banking relations

Across the globe it is widely observed that firms deal with more than one bank.[1] In this section we review the theoretical literature on multiple bank relationships. The most intuitive explanation of the existence of a single bank relation is based on cost minimization: to deal with more than one bank is costly. First, transaction costs increase because both screening and monitoring costs are duplicated. It is more expensive to market debt claims to multiple creditors (Bris and Welch, 2005). These arguments are at the core of the Diamond (1984) delegated monitoring model. The Diamond model predicts a firm to deal with a single bank that pools the costs of asymmetric information. A single bank moreover avoids free-riding problems by private investors. So in all activities prior and during the loan contract it would be cheaper to deal with a single bank. But also in ex post cases, like in the case of bankruptcy, multiple relations will increase the costs of, e.g. handling debt renegotiation (Bolton and Scharfstein, 1996).

The second determinant of the number of banking relationships is the degree of competition in the banking market. If competition is low (a few institutions dominate the market) it is likely that the number of banking relationships drops. The incumbent bank will be able to extract rents (see Broecker, 1990). On the other hand, if competition is fierce and a large number of

[1] See Ongena and Smith (2000a,b) and Volpin (2000) for international evidence on multiple bank relationship.

competing banks fight for new loans, firms will try to benefit and increase the number of bank contacts.

Third, and related to the second item, is the hold-up problem. If a relationship bank is not affected by heavy competition, it might consider using the acquired private corporate information to extract rents, thus distorting entrepreneurial incentives and causing inefficient investment choices (see Sharpe, 1990; Rajan, 1992). Carletti (2004) presents a theoretical monitoring model to explain this idea. Multiple banking entails duplication of effort and sharing of benefit, which lead to a reduction in the overall monitoring intensity but not necessarily to higher loan rates, due to the presence of diseconomies of scale in monitoring. Another form of the hold-up problem might also exist. In a competitive banking environment, a high-quality firm that tries to switch from its previous to a new loan provider gets pooled with low-quality firms and might be forced to pay too high an interest rate. This prevents a high-quality firm from increasing the number of banking relationships.

A fourth class of arguments against the case of single banking relates to using multiple contacts as insurance against liquidity or liquidation risk. The worst case for the firm is that a profitable project has to be liquidated prematurely. Suppose that the loan includes a refinancing stage. If the relation bank cannot rollover their initial loan the firm in liquidity need has to apply for loans from non-relation banks (arm's-length financiers). These banks probably think that the applying firms have 'lemon' projects (see also Detragiache et al., 2000).

A fifth class of arguments is formed by the ability among lenders to coordinate activities in an environment with so-called soft-budget constraints. In a largely decentralized economy, banks cannot commit to finance unprofitable long-term projects because dispersed banks with limited capital will find it costly to coordinate actions (Dewatripont and Maskin, 1995; Bolton and Scharfstein, 1996; Bris and Welch, 2005). In the Bolton–Scharfstein model the manager has an incentive to strategically default the project (e.g. by diverting cash to herself). Coordinating with multiple lenders disciplines the manager. On the other hand it might be the case that fewer creditors have more incentives to check managers. Such creditors have an incentive to invest more in monitoring activity (see Bris and Welch, 2005). Writing debt contracts with multiple lenders is costly though (see the first class of arguments). In any case, a decrease of default risk will increase the number of lenders. The same holds to the degree of synergy between the assets of the firm (the degree to which the assets are worth more together than apart) or the liquidation value.

Finally, the type of business activity might affect the number of creditors. Take the example of a highly innovative, high quality firm that invests to a large extent in R&D. If this firm believes that it will be successful, it will not be willing to give all the information to multiple financiers (see Yosha, 1995). Low-quality firms on the other hand might want to contact multiple banks. Von Rheinbaben and Ruckes (1998) analyze a model that includes the competition on the output market for firms. The main point is again that leakage of information is detrimental to a firm's success on the output market. The firm can avoid this in two ways. First, it decides on the amount of information given to creditors, and second, it can change the number of contacts. If a firm gives more information to a bank and its quality is high, it can get a lower interest rate. More creditors again intensify competition. Highly rated firms optimally try to deal with many banks and will disclose as little information as they can. Bhattacharya and Chiesa (1995) stress the point that it might be optimal for a bank to inform competitors of the innovating firm with respect to the new technology in order to avoid financial distress. Bolton and Scharfstein (1996) also predict that firms in non-cyclical industries will chose a lower number of lenders.

Next we turn to the role of a main bank. The main bank of a firm is frequently defined as the bank with the largest share of loans. However, main bank relations are not simply confined to

lending relationships, but cover a wider spectrum of aspects. Aoki et al. (1994) stress five aspects of main bank relations: lending relationship, client issuances of public debt, equity cross-shareholding, business settlement accounts, and provision of information services and managerial resources. Intertwined with each other, these relations determine the optimal number of creditors of the firms affiliated with their main bank. However, there are very few studies directly dealing with the determination of the optimal number of creditors in the context of a main bank system.[2] To consider this issue, it is important to understand why main bank financing is so prevalent. Hoshi and Kashyap (2001) discuss benefits and costs of main bank financing. A main bank holds a large share of loans of affiliated firms, which gives a strong incentive to collect information about firms' prospects and to monitor the firms. It helps to mitigate problems with asymmetric information that lead to adverse selection and moral hazard. The studies of Kaplan and Minton (1994), Sheard (1994a), Kang and Shivdasani (1995, 1997), Miyajima (1998) and Morck and Nakamura (1999) provide the evidence that main banks closely monitor their client firms and dispatch directors to them in the event of financial trouble. Close monitoring by a main bank enables other banks to reduce the resources spent on gathering information and monitoring, as is suggested by Diamond's delegated monitoring model (see Diamond, 1984). Other banks let the main bank monitor the firm on behalf of them. Sheard (1994b) discusses the efficiencies of main bank lending from the point of view of avoidance of monitoring duplication. Having a line of credit from a main bank, it might also be easier for the firm to attract more loans from other banks. Close monitoring also helps to identify the types of distress their clients face and thus reduce the cost of distress (Hoshi et al., 1990; Sheard, 1994c). Furthermore, shareholding by a main bank leads to mitigation of conflict between equity holders and debt holders.[3] Taken together, affiliated firms might raise funds easily from other banks since other banks do not have to bear the expenses associated with lending. Thus the optimal number of creditors will be larger for firms affiliated with a main bank than for independent firms.

However, it should be noted that concentration of information about affiliated firms at a main bank is a double-edged sword. Sheard (1989) argues that a Japanese firm might also be afraid of monopoly exploitation by the bank, or banks themselves want to share risk, or regulation might block larger loan supply by a single bank. Therefore there can be different arguments, even in the group structure cases, why firms borrow from multiple banks. Prowse (1990) argues that debt-rich firms tend to invest in projects that benefit shareholders. A way to circumvent this agency problem is to align the debt and equity stakes in the firm. From a slightly different angle, we might argue that too much dependence on a main bank is harmful to its affiliated firms. In the 1990s, banks were burdened with massive non-performing loans, which hindered the intermediary role of banks severely. In this situation, excessive reliance on a main bank makes it difficult for its affiliated firms to switch loans from one bank to the other since other banks have not accumulated information on those firms.

3. Description of the data

The primary source of data used is the set of financial statements of firms listed on the main Japanese stock markets. The dataset is compiled by the Japan Economic Research Institute and the Development Bank of Japan. In addition to the balance sheet and profit–loss accounts, a

[2] Exceptions are Horiuchi (1993, 1994) who present a descriptive analysis of multiple bank relations of Japanese firms.

[3] It should be noted that group main banks are not always acting in the interest of the firms, given that these firms are charged higher interest rates (see Weinstein and Yafeh, 1998).

qualitative and detailed description of stock ownership structure and sources of long-term loans is also given. As for the stock ownership structure, the dataset reports the top-10 shareholders' names and the corresponding stakes in total number of shares. It also reports the origins of long-term loans in terms of the name of the issuing financial institution and the corresponding stakes in outstanding long-term loans. That is to say, we can identify from which financial institution(s) the firms attract long-term loans.[4] The dataset starts in 1957, but the qualitative information on the stock ownership and long-term loans is only available for the period from 1982 to 1999.

The total number of firm-year observations from 1982 to 1999 is 34,939. Some of the observations are excluded, mainly due to internal inconsistencies. For instance, in some cases the total sum of each source of the long-term loans outstanding does not match the individual balance sheet registration. In most cases, the former is smaller than the latter, indicating that the information on the sources of long-term loan is sometimes not exhaustive. Also, the source of a long-term loan in some cases does not correspond to a specific individual financial institution, but is classified in the ''miscellaneous financial institutions'' category. In such cases we cannot identify the accurate number of bank relations. This is also true for the case of ''foreign banks.'' As a result of this data screening, 20,740 firm-year observations remain in the sample.[5]

We define the total number of banks that provide long-term loans as the number of long-term loan banking contacts of the corresponding firms.[6] Table 1 presents the number of long-term bank relations and related indicators over the sample period. We classify the number of bank relations into the following seven classes:

(1) no long-term loan;
(2) a single relation;
(3) 2–4 relations;
(4) 5–7 relations;
(5) 8–10 relations;
(6) 11–15 relations;
(7) more than 16 relations.[7]

As is shown in row (13) of the table, the percentage of firms with long-term loans shows a decline during the sample period. This is mainly due to the development of alternative financing methods, like corporate bond and equity financing. It should be noted that the percentage of firms with long-term loans remains more than 65% in recent years, indicating that the instrument of a long-term loan is still an important source of finance for Japanese firms. The percentage of single loan cases, which is a special concern of this study, is shown in the bottom line of Table 1 (see also Fig. 1 of Section 1).

The mean and the median of the number of long-term loan relations are shown in Fig. 2. The average number of relations decreases from 7.74 in 1982 and reaches a lowest level of 6.65 in 1989. After 1990, the number moves around 7 except for the sharp decline in 1997. This means that the concentration of long-term loans has been gradually promoted in the bubble period, but

[4] The label financial institution refers to life and non-life insurance companies as well as public and private banks. Insurance companies are also the main long-term funds suppliers in Japan.

[5] Most of the firms in the sample are manufacturing firms. The distribution of the sample firms by industry is provided in Appendix 1.

[6] We do not take the duration of bank–firm relations into consideration in this study.

[7] This categorization will be used for the estimation of the multiple-choice model in the next section. The distribution of the uncategorized number of bank relations over the sample period is provided by year in Appendix 2.

Table 1
Number of bank relations with respect to long-term loans (NBL)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
(1) NBL = 0	–	158	200	235	258	283	315	355	391	406	404	409	404	416	446	479	502	516	508	6,685
(2) NBL = 1	–	49	59	59	66	70	82	86	90	96	93	69	62	69	65	69	94	103	89	1,370
(3) $2 \leq$ NBL ≤ 4	–	142	140	154	158	155	149	149	172	187	191	192	207	189	213	220	260	254	244	3,376
(4) $5 \leq$ NBL ≤ 7	–	162	176	159	160	188	179	184	184	189	202	204	187	207	222	230	236	272	286	3,627
(5) $8 \leq$ NBL ≤ 10	–	117	126	148	144	138	140	126	146	153	159	156	165	140	157	170	168	187	195	2,735
(6) $11 \leq$ NBL ≤ 15	–	104	90	87	106	89	96	88	85	94	103	111	126	142	143	134	126	138	157	2,019
(7) $16 \leq$ NBL	–	47	49	48	43	48	44	42	35	42	51	50	57	54	56	54	49	84	75	928
(8) Total	–	779	840	890	935	971	1005	1030	1103	1167	1203	1191	1208	1217	1302	1356	1435	1554	1554	20,740
(9) Mean of NBL	–	7.74	7.39	7.27	7.28	7.20	7.07	6.86	6.65	6.75	6.99	7.13	7.41	7.39	7.35	7.17	6.67	7.22	7.38	7.16
(10) Median of NBL	–	7.00	7.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	7.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
(11) Mean of Herfindahl index	–	0.370	0.376	0.381	0.384	0.386	0.399	0.404	0.408	0.409	0.393	0.369	0.358	0.356	0.355	0.360	0.387	0.369	0.351	0.377
(12) Median of Herfindahl index	–	0.281	0.290	0.285	0.283	0.288	0.286	0.292	0.299	0.297	0.284	0.273	0.263	0.251	0.257	0.265	0.282	0.260	0.254	0.276
(13) Long-term loans (%)	–	79.7	76.2	73.6	72.4	70.9	68.7	65.5	64.6	65.2	66.4	65.7	66.6	65.8	65.7	64.7	65.0	66.8	67.3	67.8
(14) Single relation (%)	–	7.9	9.2	9.0	9.7	10.2	11.9	12.7	12.6	12.6	11.6	8.8	7.7	8.6	7.6	7.9	10.1	9.9	8.5	9.7

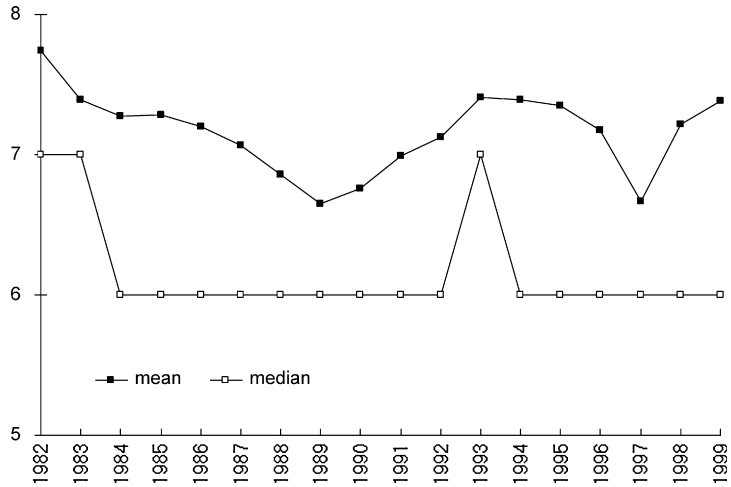

Fig. 2. Mean and median number of long-term loans.

recovered to the original level after the collapse of the bubble. The median of the number of long-term bank relations is rather stable over the sample period.

As a final description of bank–firm relations, the time series of the Herfindahl index of long-term loans per firm is presented in Fig. 3. The average of this index increases from 0.370 in 1982 to its maximum of 0.409 in 1990. The same pattern can be seen for the median value. The concentration gradually decreases to a low level of 0.335 in 1995 and increases after.

4. Determinants of the number of bank–firm relations

We investigate the determinants of the number of bank–firm relations based on the balance sheet and profit and loss account information of firms. It does not necessarily imply that we

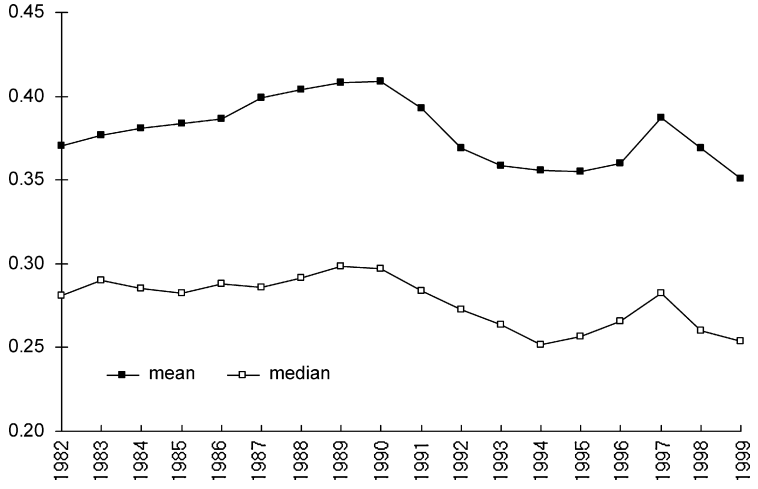

Fig. 3. Mean and median Herfindahl index of long-term loans.

Table 2
Sample means of the explanatory variables

Symbol	Definition	1982–1999	1982–1989	1990–1999
(1) SAL	Sales amount[a]	65.528	60.056	68.900
(2) ROA	Return on total asset (%)	1.464	2.213	1.002
(3) DAR	Debt-to-total assets ratio (%)	64.227	68.967	61.301
(4) LAR	Liquid to total assets ratio (%)	59.294	64.603	56.024
(5) CBR	Corporate bond to total debt ratio (%)	8.998	5.293	11.280
(6) SLR	Short-term loans to total debt ratio (%)	19.637	20.733	18.961
(7) R&D	R&D expenses to total sales ratio (%)	0.639	0.581	0.675
(8) No_1	Number of observations in the first stage	14,055	5358	8697
(9) No_2	Number of observations in the second stage	12,685	4797	7888

[a] Unit: billions of 1995 yen. The figures in the financial statements are deflated by the GDP deflator (1995 = 1.00) in the *Annual Report of National Account*, Economic and Social Research Institute, Cabinet Office of the government of Japan.

ignore the supply side of bank–firm relationships. It is true that even if the firm applies for a loan, it is not always accepted by the bank, but the decision of the bank is mainly based on the firms' information on profitability and solvency.[8]

We model the determination of the number of bank relations in two stages. First, firms decide to have single or multiple bank relations. Second, firms decide how many bank relations they have conditional upon the choice of having multiple bank relations. There may be a substantial difference in the nature of choices of both types. In the estimation procedure, first we estimate the decision to have a single- versus multiple-bank contract by a binary logit model. Next, the decision to opt for multiple loans is analyzed using a multinomial logit model. We estimated the same model for three different sample periods; the whole period (1982–1999), the 'bubble' period (1982–1989), and the post-bubble period (1990–1999).

Based on the discussion in Section 2, we use the following variables to explain the choice of the number of bank relations:

- size of the firm: total real sales, SAL;
- profitability of the firm: return on assets, ROA;
- solvability of the firm: debt-to-assets ratio, DAR;
- liquidity of the firm: liquid to total assets ratio, LAR;
- alternative financing sources of the firm: corporate bonds to debt ratio, CBR and the short-term loan to debt ratio, SLR;
- the R&D activity of the firm: R&D expenses to total sales ratio, R&D.

The sample means of the above variables in the whole sample and the two sub-sample periods are presented in Table 2. There is a substantial difference in return on assets (ROA) between the bubble period and the post-bubble period, indicating that the profitability of firms decreased after the collapse of the bubble. The corporate bond to total debt ratio (CBR) drastically increased from 5.29% in the former to 11.28% in the latter sample period. The decrease of the importance of long-term loans over the sample period observed in Table 1 is partly explained by the increasing importance of corporate bonds as an alternative financing source. The short-term loan to total debt ratio (SLR) also decreases in the latter sample period, although it can also be

[8] Ideally the balance sheet information of the bank is needed to fully understand bank–firm relations.

regarded as an alternative to long-term financing.[9] The table also provides the number of observations available for estimation. In the estimation of the binomial logit model, 14,055 sample firms with long-term loans are included in the sample. It should be noted, however, that in the estimation of the multinomial logit model, which is conditional upon the choice for more than one relation, firms with a single bank relation are excluded from the sample. Accordingly, 12,685 sample firms are used for estimation in the second stage.

The pattern of financial governance of Japanese firms may play a crucial role in the determination of the number of bank relations. The Japanese industrial organization differs to a large extent from most western equivalents. Mutual ownership of stock is quite common, especially in the industrial group structures (keiretsu). Within the group structure, long-lived equity holdings and lender relations are the key financial characteristics. As is well known, banks play a central role as ''Main Bank'' in these business groups, so it is valuable to incorporate the relation between simultaneous holdings of loans and equity into the analysis, especially if we want to test the hypothesis that firms with a main bank relation want fewer banking contacts. In order to take this hypothesis into account, we classify the firms into the following seven categories from the viewpoint of the interaction between loan and equity holdings[10]:

(1) the largest equity owner is also the largest debt owner;
(2) the largest equity owner resorts under the top-3 debt owners;
(3) the largest equity owner resorts under the top-10 debt owners;
(4) the largest debt owner resorts under the top-3 equity owners;
(5) the largest debt owner resorts under the top-10 equity owners;
(6) one of the top-3 equity owners resorts under the top-3 debt owners;
(7) one of the top-10 equity owners resorts under the top-10 debt owners.

Table 3 presents the percentage of firms for the above seven cases by year.[11] As is expected, the first class is the rarest case: a little more than 5% of the firm-year observations fall into this class. Note that we consider all equity holders including non-bank equity holders. Although equity ownership by banks is highly restricted in Japan,[12] still about half of the firm-year observations are classified in class (6) and about 90% of the firm-year observations in our sample fall in class (7).

In order to incorporate the effect of the governance structure measured by the interaction between loan and equity holdings, we use dummy variables, reflecting the above seven categories, in both the binomial and multinomial regression model. In what follows, we label these ''governance'' dummy variables by GD_i ($i = 1, \ldots, 7$), where subscripts from 1 to 7 are

[9] Mean and standard deviations of the seven explanatory variables are shown by year in Appendix 3, where we observe an apparent decrease of ROA and increase of both CBR and SLR.

[10] These seven classes are not mutually exclusive. For example, class (1) is always included in the classes from (2) to (7). In this sense, the category (1) is the case where the relation between loan and equity holdings is the strongest. This is also true for a comparison between the classes (2) and (3), between (4) and (5), and between (6) and (7), where the classes (2), (4), and (6) have the stronger relation, respectively.

[11] The figures in Table 3 are those for the sample firms with long-term loans that are used in estimation. Needless to say, if the firms with no long-term loans were included, the corresponding figures would be smaller. For example, the percentage of class (7) in 1982 would be 66.88 (=83.98 × 621/779), where 621 is the number of firms with long-term loans and 779 is the number that includes firms with no long-term loans (see Table 1).

[12] In Japan, the maximum share of equity holding of a specific firm by a bank is restricted to at most 5% since 1987. Before 1987, starting in 1953, this figure was 10% (Flath, 1993). For insurance companies the maximum limit still is 10%. It should be noted that in our dataset, financial institutions include life insurance companies as well as private banking companies. The equities held by individual and institutions through trust banks are classified as individual holdings.

Table 3
The relationship between stockholders and debt suppliers: percentage of firms in each category

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1982	4.83	8.86	14.33	23.99	56.36	40.74	83.90
1983	4.22	8.28	12.81	25.16	57.03	42.34	84.22
1984	5.19	10.08	14.05	25.95	59.24	43.97	85.34
1985	4.73	10.19	13.59	26.29	59.97	43.87	84.93
1986	4.65	8.72	12.21	26.45	61.63	44.77	85.61
1987	4.78	9.28	12.61	28.41	63.77	45.36	87.25
1988	4.59	8.74	12.30	25.93	63.41	42.96	86.52
1989	5.06	9.13	13.20	30.76	66.57	46.63	87.36
1990	4.99	10.38	14.45	31.27	64.78	46.78	87.78
1991	4.88	10.01	14.02	31.79	63.70	46.56	87.23
1992	3.58	10.23	14.58	31.84	64.45	49.10	88.87
1993	5.22	12.19	16.67	34.95	68.28	51.99	90.17
1994	4.49	10.99	15.61	35.21	69.91	50.81	90.76
1995	5.84	11.68	16.71	32.71	68.69	48.95	90.42
1996	5.02	11.63	15.28	33.30	72.63	48.69	89.85
1997	5.47	10.83	14.68	34.30	72.45	49.30	88.96
1998	5.78	10.50	14.35	35.45	72.93	47.69	89.88
1999	5.83	11.09	14.91	36.81	72.75	49.14	89.39
Total	5.01	10.27	14.35	31.16	66.23	46.99	87.96

(1) The largest equity owner is also the largest debt owner; (2) the largest equity owner resorts under the top-3 debt owners; (3) the largest equity owner resorts under the top-10 debt owners; (4) the largest debt owner resorts under the top-3 equity owners; (5) the largest debt owner resorts under the top-10 equity owners; (6) one of the top-3 equity owners resorts under the top-3 debt owners; (7) one of the top-10 equity owners resorts under the top-10 debt owners.

corresponding to the above 7 classes. That is to say, if the sample firm belongs to class (1), the governance dummy variable, labeled GD_1, takes 1, and otherwise 0 for corresponding observations. It is expected that, moving from GD_1 to GD_3, for instance, increases the number of multiple bank contacts. Although debt also contains non-loans, the probability of a single lending relation decreases if the largest equity holder moves from the first debt holder to a top-10 debt holder. If a top-10 debt holder moves from a top-10 equity holding position to the single top-equity holder, one could argue that the relative probability of a single loan relation will become larger. The bank can control the firm not only via the supply of loans, but also as a top-equity holder. Thus the bank is probably willing to offset the liquidity risk the firm faces, lowering the firm's intentions to contact multiple banks. The firm has less costs of asymmetric information and will also prefer a single relationship (see Sheard, 1989).

First, we present a binomial logit model for the decision to choose either a single loan or multiple loans. In the logit estimation the dependent variable, Y, takes 1 for the case of single loan and 0 for multiple loans. The results are presented for three different sample periods, the whole period, the bubble period, and the post-bubble period, in Table 4. The rows give the results for each type of governance dummy variables, say GD_i ($i = 1, \ldots, 7$) as listed above. The columns give the estimated parameters of the corresponding determinants listed in Table 2. The last column gives the pseudo-coefficient of determination (R^2) and the correct prediction ratio (CPR) of the estimated model. The impact of each determinant on the probability of choosing a single bank relation can be calculated from the parameter estimates. For the discrete choice model, it is more substantial to interpret the results in terms of probability rather than the parameter estimates. In what follows, we will discuss the estimated results from the viewpoint of the impact

Table 4
Estimation results of the binomial logit model of single and multiple relations

	SAL	ROA	DAR	LAR	CBR	SLR	R&D	GD_i	R^2/CPR
Sample period: 1982–1999									
(1) GD_1	0.0002 (0.85)	−0.0086 (0.96)	−0.0412** (19.6)	0.0371** (15.4)	0.0159** (7.81)	−0.0007 (0.30)	−0.0973** (4.26)	−0.6442** (3.67)	0.0655/0.9030
(2) GD_2	0.0003 (1.49)	−0.0081 (0.92)	−0.0406** (19.2)	0.0366** (15.2)	0.0165** (8.10)	−0.0003 (0.13)	−0.0915** (4.02)	−1.4830** (8.62)	0.0727/0.9031
(3) GD_3	0.0005* (2.19)	−0.0076 (0.86)	−0.0401** (19.0)	0.0360** (15.0)	0.0174** (8.52)	−0.0005 (0.20)	−0.0795** (3.46)	−1.9466** (11.3)	0.0810/0.9035
(4) GD_4	0.0001 (0.45)	−0.0106 (1.22)	−0.0396** (18.8)	0.0367** (15.2)	0.0153** (7.48)	−0.0013 (0.55)	−0.0927** (4.07)	−0.8158** (10.6)	0.0737/0.9039
(5) GD_5	−0.0002 (0.59)	−0.0087 (0.98)	−0.0373** (17.5)	0.0361** (14.8)	0.0142** (6.84)	−0.0013 (0.56)	−0.1058** (4.52)	−1.0356** (16.7)	0.0853/0.9029
(6) GD_6	0.0002 (0.92)	−0.0133 (1.61)	−0.0378** (17.9)	0.0357** (14.7)	0.0154** (7.41)	−0.0007 (0.31)	−0.0924** (4.07)	−1.5811** (20.6)	0.1041/0.9031
(7) GD_7	−0.0003 (0.95)	−0.0142 (1.61)	−0.0295** (12.7)	0.0343** (12.9)	0.0136** (5.89)	0.0009 (0.36)	−0.1155** (4.44)	−2.8237** (39.6)	0.1891/0.9163
(1) GD_1	0.0155	−0.0020	−0.0038	0.0025	0.0012	−0.0001	−0.0084	−0.0516	
(2) GD_2	0.0265	−0.0019	−0.0038	0.0025	0.0012	−0.0001	−0.0079	−0.1215	
(3) GD_3	0.0383	−0.0018	−0.0037	0.0024	0.0013	−0.0001	−0.0069	−0.1589	
(4) GD_4	0.0085	−0.0020	−0.0037	0.0025	0.0011	−0.0001	−0.0080	−0.0668	
(5) GD_5	−0.0127	−0.0018	−0.0034	0.0024	0.0010	−0.0001	−0.0089	−0.0842	
(6) GD_6	0.0159	−0.0020	−0.0034	0.0023	0.0011	−0.0001	−0.0077	−0.1246	
(7) GD_7	−0.0179	−0.0013	−0.0021	0.0020	0.0008	0.0000	−0.0075	−0.1830	
Sample period: 1982–1989									
(1) GD_1	0.0006* (2.02)	−0.0001 (0.01)	−0.0501** (13.9)	0.0374** (9.03)	0.0087* (2.22)	−0.0045 (1.20)	−0.1776** (4.59)	−0.8325** (2.81)	0.0901/0.8960
(2) GD_2	0.0007* (2.20)	0.0001 (0.00)	−0.0499** (13.9)	0.0372** (9.01)	0.0094* (2.38)	−0.0040 (1.08)	−0.1733** (4.46)	−1.6331** (5.61)	0.0980/0.8964
(3) GD_3	0.0008* (2.47)	−0.0001 (0.00)	−0.0499** (13.8)	0.0371** (8.94)	0.0105** (2.67)	−0.0044 (1.18)	−0.1603** (4.06)	−2.1410** (7.38)	0.1080/0.8964
(4) GD_4	0.0005 (1.66)	−0.0015 (0.10)	−0.0490** (13.6)	0.0367** (8.86)	0.0080* (2.02)	−0.0052 (1.37)	−0.1733** (4.48)	−0.9426** (7.02)	0.0996/0.8954
(5) GD_5	0.0003 (0.99)	0.0029 (0.20)	−0.0449** (12.3)	0.0356** (8.51)	0.0071 (1.78)	−0.0047 (1.26)	−0.1974** (4.98)	−1.1117** (10.9)	0.1124/0.8988
(6) GD_6	0.0005 (1.63)	−0.0100 (0.67)	−0.0480** (13.0)	0.0351** (8.41)	0.0090* (2.24)	−0.0041 (1.09)	−0.1646** (4.19)	−1.7969** (13.5)	0.1367/0.8951
(7) GD_7	0.0003 (0.81)	−0.0111 (0.71)	−0.0354** (8.59)	0.0317** (6.74)	0.0050 (1.09)	−0.0033 (0.84)	−0.1884** (4.11)	−3.0019** (25.3)	0.2350/0.9181
(1) GD_1	0.0156	−0.0007	−0.0034	0.0030	0.0013	−0.0001	−0.0079	−0.0526	
(2) GD_2	0.0267	−0.0007	−0.0033	0.0030	0.0013	0.0000	−0.0074	−0.1201	
(3) GD_3	0.0376	−0.0006	−0.0032	0.0029	0.0014	0.0000	−0.0064	−0.1562	
(4) GD_4	0.0001	−0.0009	−0.0032	0.0030	0.0012	−0.0001	−0.0075	−0.0658	
(5) GD_5	−0.0119	−0.0007	−0.0030	0.0029	0.0011	−0.0001	−0.0084	−0.0820	
(6) GD_6	0.0160	−0.0010	−0.0029	0.0028	0.0012	−0.0001	−0.0072	−0.1227	
(7) GD_7	−0.0182	−0.0009	−0.0019	0.0022	0.0009	0.0001	−0.0074	−0.1813	

Sample period: 1990–1999

(1) GD_1	−0.0003 (0.73)	−0.0160 (1.53)	−0.0363** (13.7)	0.0385** (13.0)	0.0182** (7.56)	0.0014 (0.46)	−0.0485 (1.73)	−0.5111* (2.34)	0.0556/0.9066
(2) GD_2	−0.0001 (0.24)	−0.0153 (1.47)	−0.0353** (13.4)	0.0377** (12.7)	0.0188** (7.75)	0.0017 (0.56)	−0.0417 (1.50)	−1.3819** (6.47)	0.0622/0.9069
(3) GD_3	0.0001 (0.31)	−0.0143 (1.38)	−0.0346** (13.1)	0.0369** (12.5)	0.0195** (8.06)	0.0017 (0.56)	−0.0300 (1.07)	−1.8316** (8.57)	0.0696/0.9066
(4) GD_4	−0.0004 (0.99)	−0.0178 (1.78)	−0.0346** (13.1)	0.0383** (12.8)	0.0179** (7.38)	0.0009 (0.29)	−0.0445 (1.60)	−0.7707** (8.08)	0.0635/0.9064
(5) GD_5	−0.0007 (1.75)	−0.0172 (1.66)	−0.0333** (12.5)	0.0380** (12.6)	0.0168** (6.85)	0.0008 (0.26)	−0.0509 (1.80)	−1.0050** (12.7)	0.0740/0.9071
(6) GD_6	−0.0002 (0.55)	−0.0174 (1.83)	−0.0328** (12.5)	0.0373** (12.5)	0.0178** (7.26)	0.0015 (0.50)	−0.0495 (1.80)	−1.4747** (15.4)	0.0897/0.9077
(7) GD_7	−0.0010* (2.20)	−0.0179 (1.71)	−0.0268** (9.30)	0.0366** (11.2)	0.0168** (6.23)	0.0033 (1.04)	−0.0721* (2.30)	−2.7701** (30.2)	0.1675/0.9149
(1) GD_1	−0.0203	−0.0013	−0.0029	0.0031	0.0014	0.0001	−0.0038	−0.0405	
(2) GD_2	−0.0064	−0.0012	−0.0028	0.0030	0.0015	0.0001	−0.0033	−0.1088	
(3) GD_3	0.0081	−0.0011	−0.0027	0.0029	0.0015	0.0001	−0.0023	−0.1431	
(4) GD_4	−0.0278	−0.0014	−0.0027	0.0030	0.0014	0.0001	−0.0035	−0.0605	
(5) GD_5	−0.0523	−0.0013	−0.0026	0.0029	0.0013	0.0001	−0.0039	−0.0775	
(6) GD_6	−0.0143	−0.0013	−0.0025	0.0028	0.0014	0.0001	−0.0038	−0.1119	
(7) GD_7	−0.0661	−0.0011	−0.0017	0.0023	0.0011	0.0002	−0.0046	−0.1765	

The figures in parentheses are the asymptotic *t*-values, and the symbols * and ** indicate that the corresponding coefficients are significant at the 5% level and 1% level, respectively. R^2 is the pseudo-R-squared and CPR stands for the correct prediction ratio by the estimated model. The impact of SAL on probability is in terms of 10^3. Marginal probabilities are in the lower panel for each sample period.

on the probabilities. These figures are presented in the lower panel of the table for each sample period.

Table 4 shows that a higher debt-to-assets ratio (DAR) decreases the probability of a single loan relation in all cases. For example, for the whole period, an increase of DAR by one percentage point lowers the probability of having a single loan by 0.21% (with GD_7) to 0.38% (with GD_1 and GD_2). This is quite a plausible result, because more debt implies a higher loan demand, which increases the probability of multiple loans. It is also found that a higher liquid to total assets ratio (LAR) increases the probability of a single bank relation. Firms with relatively more liquid assets do not need liquidity insurance and rely on a single bank. Table 4 also shows that the size of the firm (SAL) and profitability (ROA) do not have a systematic impact on the decision between single and multiple bank loans. Of the alternative financing forms, the short-term loans SLR and the corporate bond to total debt ratio CBR, only the corporate bond to debt ratio has a significant impact on the single versus multiple loan relation decision. A higher value of CBR indicates two features: more bonds relative to loans will increase the probability of a single loan by itself. But secondly, as explained above, corporate bonds also signal quality. A higher bond rating reduces the need for multiple banking contacts.

The governance dummies GD_i ($i = 1, \ldots, 7$) have a significant negative impact on the probability of a single bank relation in any case. This counterintuitive result can be interpreted from the following different angles. First, the firm might use a main bank relation as a signal of quality in attracting other debt suppliers' attention.[13] It is similar to a favorable impact on a firm's stock price when it publicly reveals information about a bank relationship. The news that a firm has a main bank may imply that the main bank will bail the firm out in case of financial trouble, which may prompt other banks to lend to the firm. Secondly, a main bank might take advantage of its position as information monopolist and charge higher interest rates.[14] This is known as the hold-up problem. To prevent the hold-up problem, firms might have multiple bank relations to look for cheaper alternatives. Thirdly, as is discussed by Detragiache et al. (2000), when the main bank health deteriorates, the firm has an incentive to diversify bank relations to secure stable loans from different banks. This story is especially applicable to the Japanese financial scene in the late 1990s, when a lot of financial institutions went into bankruptcy. Finally, it might be in the interest of the main bank as an equity holder to have some liquidity insurance. If we compare the results of the GD_i-lines one should note that for the cases where the bank is the largest equity holder, the probability of a single borrowing relation decreases with a more modest position of the bank as a top-debt supplier. The other way round, if the bank is the largest supplier of debt, the probability of a single relation increases if the bank becomes a more important equity holder. So there are two effects: a main bank relation leads to a larger probability of multiple banking contacts, but equity concentration leads to a relatively higher probability of a single loan.

Comparing the bubble and post-bubble period one can observe that there are no substantial differences in terms of marginal effects on the probabilities. An increase of the debt-to-assets ratio decreases the probability of a single relation slightly more in the bubble period than in the post-bubble period. The other derivatives are also comparable across sub-periods. The most striking difference is the impact of R&D-expenses. In the bubble period, more R&D expenses decrease the probability of a single relation: this supports the Bhattacharya–Chiesa hypothesis

[13] There are several event studies that examine the stock market reaction to the news of having a bank relation. For example, see James (1987), Billett et al. (1995) and Shockley and Thakor (1998).

[14] See Sharpe (1990), Rajan (1992) and Weinstein and Yafeh (1998) for the hold-up problem.

that highly rated firms try to deal with many banks in order to disclose as little information as they can. In the post-bubble period, however, the significant impact of R&D expenses vanishes. As for the goodness of fit of the model, the pseudo-coefficients of determination are around 0.1, but the correct prediction rate is around 90% for all models. In general, we can conceive the relatively stable impact of the selected determinants on the single–multiple decision irrespective of the choice of GD_i's.

Once firms decided to have multiple loans, how many relations do they have? We analyze this decision by a multinomial logit model with the same explanatory variables as in the binomial logit model. In the estimation of the multinomial logit model, the number of bank relations (NBL) is transformed into the categorical variables shown in Table 1. It should be noted here that the firms with a single bank relation are excluded from the sample in this stage of estimation. That is to say, the dependent variable Y takes the following values corresponding to each category of bank relations:

(1) 2–4 relations, $Y = 0$;
(2) 5–7 relations, $Y = 1$;
(3) 8–10 relations, $Y = 2$;
(4) 11–15 relations, $Y = 3$;
(5) over 16 relations, $Y = 4$.

Table 5 presents the results of the estimation of the multinomial logit model. The estimation is based on the new sample that excludes the observations with a single bank relation. The numbers of observations for the three different sample periods are also shown in Table 2. Table 5 has the same structure as Table 4. We present both the estimated parameters and the impact of the explanatory variables on the probabilities of corresponding choices. In estimating the model, the parameters for the choice of the smallest number of relations (2–4 bank relations) are normalized to zero. Thus, all parameters should be interpreted as differences from the base case $Y = 0$. We include only the results for one of the main bank relation variables GD_3.[15]

Table 5 shows that in most cases there is a split between less than and more than 8 banking contacts. Take for example the impact of the debt-to-assets ratio (DAR). A lower solvability (higher DAR) decreases the probability of having less than 8 contacts and increases the probabilities of the large contact classes. For the liquid assets ratio (LAR) the reverse holds. Liquidity-rich firms have higher probabilities of having up to 8 bank contacts. For the governance dummy variable GD_3 we find that the probability of multiple banking contacts (more than 8) increases. This is again in line with the results we found in the previous model of the choice between a single or multiple loans. Apart from these three main determinants, we now also observe that size (SAL), profitability (ROA), and the financing alternatives matter in some cases. We find that larger firms want more bank relations, especially for the large numbers of banking contacts (more than 11). There is also some evidence that in the post-bubble period profitability matters. More profitable firms want more bank relations; this finding implies that most of the loss-making firms will tend to have fewer bank relations. Alternative financing forms (the availability of corporate bonds, CBR, and short-term loans SLR) tend to make firms opt for a moderate (up to 8 loan contacts) or extensive number of banking relations. For the first group there could be a substitution of financing means while for the latter group the signaling function might be relevant. R&D-intensive firms tend to have a larger

[15] The choice of the governance dummy does not substantially affect the estimated results. Accordingly, we present the result by GD_3, since it performs better than other GD_i's from the viewpoint of goodness of fit.

Table 5
Estimation results of the multinomial logit model of the number of bank relations

	SAL	ROA	DAR	LAR	CBR	SLR	R&D	GD_3
Sample period: 1982–1999, $R^2 = 0.2423$, LR = 3363.62**								
(2) 5–7	−0.0009* (2.40)	−0.0108 (1.57)	0.0217** (12.3)	−0.0180** (9.29)	−0.0065** (3.36)	0.0002 (0.11)	−0.0277 (1.56)	0.6715** (8.12)
(3) 8–10	0.0005 (1.30)	0.0177* (2.29)	0.0469** (23.2)	−0.0364** (17.1)	−0.0088** (4.08)	−0.0077** (3.60)	0.0057 (0.30)	0.9979** (11.6)
(4) 11–15	0.0023** (7.28)	0.0100 (1.17)	0.0580** (25.1)	−0.0386** (16.5)	−0.0062* (2.57)	−0.0107** (4.41)	−0.0006 (0.03)	1.3116** (14.6)
(5) 16–	0.0030** (9.18)	0.0214 (1.92)	0.0817** (24.2)	−0.0584** (19.7)	0.0014 (0.44)	−0.0049 (1.51)	0.1223** (4.66)	1.6701** (15.1)
(1) 2–4	−0.0593	−0.0006	−0.0069	0.0052	0.0011	0.0008	0.0006	−0.1654
(2) 5–7	−0.3494	−0.0040	−0.0022	0.0012	−0.0005	0.0010	−0.0077	−0.0082
(3) 8–10	−0.0001	0.0028	0.0029	−0.0025	−0.0009	−0.0008	0.0007	0.0476
(4) 11–15	0.2647	0.0007	0.0034	−0.0019	−0.0002	−0.0010	−0.0011	0.0749
(5) 16–	0.1494	0.0010	0.0028	−0.0020	0.0004	0.0000	0.0075	0.0510
Sample period: 1982–1989, $R^2 = 0.2804$, LR = 1496.39**								
(2) 5–7	−0.0015* (2.27)	−0.0355** (2.62)	0.0277** (8.45)	−0.0191** (5.26)	0.0030 (0.69)	−0.0015 (0.46)	0.0180 (0.59)	0.9220** (6.32)
(3) 8–10	0.0002 (0.35)	−0.0086 (0.63)	0.0557** (15.0)	−0.0411** (10.4)	0.0122* (2.57)	−0.0016 (0.47)	0.0112 (0.32)	1.3036** (8.67)
(4) 11–15	0.0018** (3.33)	−0.0165 (1.03)	0.0711** (16.2)	−0.0439** (10.1)	0.0053 (0.94)	−0.0173** (4.15)	0.0226 (0.58)	1.5435** (9.61)
(5) 16–	0.0022** (3.91)	0.0116 (0.59)	0.0973** (15.8)	−0.0714** (13.4)	0.0340** (4.95)	0.0033 (0.62)	0.1938** (4.26)	1.7377** (8.69)
(1) 2–4	0.0275	0.0035	−0.0079	0.0055	−0.0013	0.0007	−0.0046	−0.1971
(2) 5–7	−0.4092	−0.0060	−0.0025	0.0018	−0.0009	0.0005	−0.0010	0.0089
(3) 8–10	0.0210	0.0013	0.0032	−0.0028	0.0011	0.0004	−0.0035	0.0715
(4) 11–15	0.2415	−0.0004	0.0040	−0.0020	−0.0005	−0.0021	−0.0014	0.0758
(5) 16–	0.1192	0.0016	0.0032	−0.0025	0.0016	0.0005	0.0105	0.0409
Sample period: 1990–1999, $R^2 = 0.2424$, LR = 2093.15**								
(2) 5–7	−0.0006 (1.25)	0.0027 (0.35)	0.0198** (9.28)	−0.0196** (8.51)	−0.0087** (3.98)	0.0008 (0.33)	−0.0519* (2.32)	0.5509** (5.43)
(3) 8–10	0.0006 (1.31)	0.0331** (3.45)	0.0442** (18.02)	−0.0351** (13.85)	−0.0144** (5.80)	−0.0101** (3.69)	0.0092 (0.39)	0.8443** (8.00)
(4) 11–15	0.0026** (6.49)	0.0267** (2.58)	0.0529** (19.05)	−0.0378** (13.58)	−0.0082** (3.04)	−0.0069* (2.27)	−0.0089 (0.35)	1.2121** (11.1)
(5) 16–	0.0035** (8.39)	0.0288* (2.15)	0.0764** (18.55)	−0.0526** (14.71)	−0.0070 (1.84)	−0.0084* (2.01)	0.0829* (2.50)	1.6235** (12.1)
(1) 2–4	−0.1115	−0.0031	−0.0065	0.0053	0.0018	0.0008	0.0031	−0.1481
(2) 5–7	−0.3133	−0.0030	−0.0021	0.0006	−0.0004	0.0012	−0.0117	−0.0164
(3) 8–10	−0.0199	0.0037	0.0029	−0.0023	−0.0014	−0.0013	0.0036	0.0348
(4) 11–15	0.2817	0.0016	0.0031	−0.0019	−0.0001	−0.0004	−0.0006	0.0760
(5) 16–	0.1629	0.0007	0.0026	−0.0016	0.0001	−0.0002	0.0056	0.0536

The figures in parentheses are the asymptotic t-values, and the symbols * and ** indicate that the corresponding coefficients are significant at the 5% level and 1% level, respectively. R^2 is the pseudo-R-squared and LR is the likelihood ratio for testing zero-slope. The impact of SAL on probability is in terms of 10^3. Marginal probabilities are in the lower panel for each sample period.

probability of having multiple relations (more than 16). We do not find striking differences between the bubble and post-bubble period.

5. Summary and conclusions

In this paper, we analyze the number of long-term bank relations that Japanese listed firms maintain. Japanese firms have a median of 6 long-term bank relations (while the mean is about 7 relations). Compared to other countries this is about the average value observed. But Japanese listed firms show a rather large variation around the mean. We present an overview of the rather extensive literature in the field of the optimal number of creditors. From this literature, we retrieve a set of likely candidate variables that might have an impact on the number of bank relations. We focus on long-term loans, since these loans play a crucial role in the Japanese economy. We estimate discrete choice models of the decision for single versus multiple relations and the decision to have a number of bank relations in certain classes (in a multinomial logit model).

Our general conclusions are as follows. Size, profitability, solvability, liquidity, and alternative financing forms determine the number of banking contacts. These variables are standard determinants of the number of bank relations. Our results also support the liquidity insurance argument to have multiple relations, as well as the impact of solvability. We pay special attention to the impact of Japanese corporate governance by including indicators of the types of relations Japanese firms tend to have with their banks. We find on average that firms having a main bank relation, typically presented by the simultaneous holdings of equity and long-term loans by a specific bank, tend to have a preference for multiple loan contracts. This might be motivated by the idea that firms want to signal quality to other financial institutions, prevent abuse of informational monopoly by the main bank and/or insure against deterioration of the main bank's health. Moreover, if the bank is a relatively important equity owner there is a relative decrease of the desire to have multiple relations. These effects tend to hold for the bubble (1981–1989) and post-bubble (1990–1999) sub-samples.

The Japanese banking system has shown some drastic changes in the last few years. Bank concentration increased, so-called bad loans are transferred to special-purpose banks, and in some cases bank management has been replaced. Our paper shows that Japanese firms tend to have important links with multiple banks, which makes Japanese corporate behavior dependent on the developments in the banking sector. For instance, in R&D intensive sectors the role of banks is important. As Ongena and Smith (2000a) argue, the stability of the banking sector interacts with the bank–firm networking systems. Banks being central to Japanese development therefore indeed have an apparent leading role in establishing conditions for a recovery of the Japanese economy.

Acknowledgements

This research is supported by Grant-in-Aid for Scientific Research (#16330038) from the Japanese Ministry of Education, Culture, Sports, Science and Technology from 2004 to 2006. We are also grateful to the *Zengin Foundation for Studies on Economics and Finance* for financial support in an earlier stage of the project, and thank Elena Carletti, Hans Degryse, Maarten Gelderman, Heinz Hermann, Robert Lensink, Steven Ongena, and participants at the 57th European Meeting of the Econometric Society in Venice, and the seminars at the University of Amsterdam, De Nederlandsche Bank, and the Bundesbank for valuable comments and suggestions.

Appendix A

Distribution of sample firms by industry

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
(1) Agriculture, forestry and fishery	–	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	3	10
(2) Mining	–	1	2	1	2	2	3	1	2	4	4	5	5	5	4	4	4	3	3	55
(3) Manufacturing	–	576	595	626	657	672	678	703	736	761	785	783	782	792	834	846	893	967	958	13,644
(4) Construction	–	67	71	80	76	80	85	72	88	93	95	88	89	86	93	105	107	76	82	1,533
(5) Electricity, gas, and water supply	–	6	4	4	3	4	4	3	4	5	4	5	6	4	5	6	4	7	8	86
(6) Wholesale and retail trade	–	55	82	97	109	125	138	151	167	180	192	191	199	200	226	240	260	308	303	3,223
(8) Real estate	–	8	8	7	7	8	7	6	10	13	11	12	11	10	11	14	17	19	20	199
(9) Transportation and communication	–	46	43	41	46	45	47	48	47	56	52	48	50	49	52	56	54	63	63	906
(10) Services	–	20	35	34	35	35	43	46	49	55	60	59	65	70	76	84	95	109	114	1,084
Total	–	779	840	890	935	971	1005	1030	1103	1167	1203	1191	1208	1217	1302	1356	1435	1554	1554	20,740

Appendix B

Number of bank relations with respect to long-term loans

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
0	158	200	235	258	283	315	355	391	406	404	409	404	416	446	479	502	516	508	6,685
1	49	59	59	66	70	82	86	90	96	93	69	62	69	65	69	94	103	89	1,370
2	48	39	50	50	41	48	55	54	73	72	65	68	65	68	82	95	76	85	1,134
3	41	51	54	49	54	47	37	60	57	65	60	67	55	67	60	79	89	75	1,067
4	53	50	50	59	60	54	57	58	57	54	67	72	69	78	78	86	89	84	1,175
5	50	61	63	60	76	65	71	78	70	76	72	66	70	75	75	84	97	95	1,304
6	59	59	53	56	59	65	58	55	51	60	66	60	77	82	83	83	96	98	1,220
7	53	56	43	44	53	49	55	51	68	66	66	61	60	65	72	69	79	93	1,103
8	59	50	53	58	49	52	57	53	55	60	49	57	55	61	70	67	66	67	1,038
9	26	40	57	56	58	53	43	59	63	59	66	61	52	53	57	58	68	72	1,001
10	32	36	38	30	31	35	26	34	35	40	41	47	33	43	43	43	53	56	696
11	22	29	30	35	23	22	20	21	22	30	35	36	47	43	44	45	40	44	588
12	27	24	23	24	23	28	26	24	27	24	28	31	30	36	30	26	44	50	525
13	20	17	9	15	17	23	22	21	18	19	16	19	23	23	27	27	23	20	359

Appendix B (*Continued*)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
14	18	8	15	18	13	15	11	10	14	18	23	22	26	23	19	16	21	23	313
15	17	12	10	14	13	8	9	9	13	12	9	18	16	18	14	12	10	20	234
16	14	13	12	14	13	12	11	8	8	10	18	17	19	20	16	11	23	16	255
17	9	7	11	3	7	9	11	8	13	10	8	10	8	5	8	11	15	11	164
18	6	8	2	3	5	7	6	3	6	5	6	8	4	7	5	10	9	10	110
19	3	5	9	10	6	3	2	4	2	5	5	7	5	9	10	5	9	11	110
20	1	2	1	1	2	2	2	2	2	6	4	1	5	2	1	4	7	8	53
21	4	4	3	1	4	2	1		2	2	1	5	5	3	4	3	4	4	52
22	2	2	3	3	3	4	3	2	1	5	2	4	1	1	1		4	3	44
23		2	2	3		1	2	2	4	2	2		3	5	5	3	5	3	44
24		2	1		3	1	2			2	2			1	1		3	4	22
25	1	1	1					2	1		1				1		2		10
26			3	2		1	1	1	1			1			2	1		1	14
27				1	2	1		1				1	1	1					8
28					1			1					1						3
29	1			1						1		1				1			5
30								1										1	2
31		2							1	1							1		5
32	1													1				1	3
34					1							1							2
35	2									1									3
36		1		1							1	1	1						5
37					1	1							1	1					4
39							1										1	1	3
40	1																		1
44																		1	1
45																	1		1
46									1										1
52	1									1									2
55	1																		1
Total	779	840	890	935	971	1005	1030	1103	1167	1203	1191	1208	1217	1302	1356	1435	1554	1554	20,740

Appendix C

Mean and standard deviations of selected explanatory variables by year

	SAL	ROA	DAR	LAR	CBR	SLR	R&D
Mean							
1982	73.0	2.546	69.909	66.473	2.658	17.312	0.456
1983	59.2	1.886	69.478	64.927	2.456	19.852	0.540
1984	57.6	2.105	69.775	65.752	3.069	20.014	0.548
1985	62.3	2.296	69.657	65.408	3.786	21.156	0.567
1986	57.3	1.853	69.065	64.115	5.100	22.649	0.622
1987	53.2	1.828	68.842	63.680	7.630	22.619	0.639
1988	57.5	2.289	68.023	63.230	7.899	21.599	0.614
1989	61.4	2.886	67.281	63.524	9.072	20.269	0.643
1990	69.3	2.724	63.963	62.757	10.037	18.276	0.649
1991	69.1	2.297	63.869	60.974	10.507	17.468	0.622
1992	71.2	1.758	62.667	58.188	12.675	17.786	0.667
1993	65.2	0.715	62.132	56.186	13.073	18.175	0.719
1994	61.2	0.499	60.769	55.288	13.777	18.254	0.701
1995	62.8	0.683	60.622	55.648	12.929	18.544	0.689
1996	64.1	0.814	60.812	55.664	11.086	19.497	0.668
1997	67.0	0.958	60.128	55.204	10.579	19.720	0.651
1998	80.3	0.687	59.667	52.104	9.700	20.276	0.656
1999	74.9	−0.428	59.784	51.394	9.446	20.534	0.724
Standard deviation							
1982	211.5	3.481	16.597	16.094	6.879	13.068	1.173
1983	114.5	3.809	18.237	16.584	6.659	14.123	1.426
1984	100.7	3.314	16.593	16.418	7.132	13.960	1.433
1985	165.6	3.684	16.360	15.955	8.532	14.882	1.506
1986	93.7	3.958	16.814	16.544	10.518	15.265	1.647
1987	73.2	3.426	16.365	16.912	13.335	15.148	1.660
1988	90.4	4.248	17.064	16.754	13.682	15.032	1.626
1989	92.2	4.403	17.055	16.573	14.346	14.880	1.666
1990	124.0	2.668	17.051	17.156	14.945	14.437	1.682
1991	112.7	4.265	17.215	17.063	14.813	13.637	1.625
1992	131.8	3.754	17.444	17.367	15.714	13.746	1.703
1993	104.9	3.539	17.659	17.478	16.291	14.082	1.751
1994	100.4	3.409	17.826	17.436	17.446	14.442	1.667
1995	102.3	3.439	18.034	17.366	16.873	14.808	1.740
1996	111.8	4.716	18.049	17.324	15.756	15.476	1.761
1997	157.4	4.768	18.591	17.562	15.650	15.690	1.664
1998	191.1	4.748	18.559	18.193	14.732	16.182	1.649
1999	177.1	7.440	21.062	18.100	15.022	16.853	1.771

All the variables are expressed in percentage units except for the sales amount, SAL. Unit of SAL is billions of 1995 yen. The figures in the financial statement are deflated by the GDP deflator (1995 = 1.00) in the *Annual Report of National Account*, Economic and Social Research Institute, Cabinet Office of the government of Japan.

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